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ABSTRACT

This document, which is intended for use by community and junior colleges throughout Mississippi, contains curriculum frameworks for the course sequences in the medical laboratory technology program. Presented in the introductory section are a description of the program and suggested course sequence. Section I lists baseline competencies, and section II consists of outlines for each of the following courses in the sequence: fundamentals of medical laboratory technology (MLT) and phlebotomy; urinalysis and body fluids; hematology I; immunology and serology; hematology II; clinical chemistry; immunohematology; parasitology; pathogenic microbiology; MLT seminar; certification fundamentals; clinical instrumentation; clinical practice I-III; and related academic courses in anatomy and physiology I and II, general biology I, general chemistry I, general chemistry lab I, general chemistry II, general chemistry lab II, microbiology and principles of chemistry I and II. Each course outline contains some/all of the following: course name and abbreviation; course classification; course description; prerequisites; and competencies and suggested objectives. Recommended tools and equipment are listed in section III. Appended are lists of related academic topics and workplace skills for the 21st century and student competency profiles for both courses. (KC)

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ED 397 293

Mississippi Curriculum Framework for

Medical Laboratory Technology

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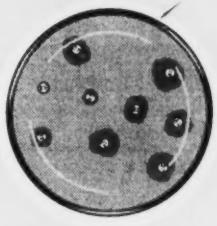

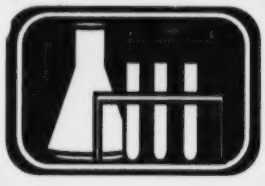

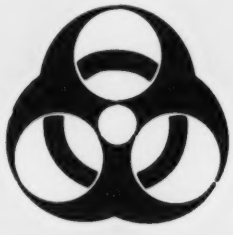

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CURRICULUM FRAMEWORK

FOR

MEDICAL LABORATORY TECHNOLOGY PROGRAMS

(CIP: 51.1004 - Medical Laboratory Technology)

POSTSECONDARY PROGRAMS 1995

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FOREWORD

In order to survive in today's global economy, businesses and industries have had to adopt new practices and procedures. Total quality management, statistical process control, participatory management, and other concepts of high performance work organizations are practices by which successful companies survive. Employers now expect their employees to be able to read, write, and communicate effectively; solve problems and make decisions; and interact with the technologies that are prevalent in today's workplace. Vocational-technical education programs must also adopt these practices in order to provide graduates who can enter and advance in the changing work world.

The curriculum framework in this document reflect these changes in the workplace and a number of other factors that impact on local vocational-technical programs. Federal and state legislation calls for articulation between high school and community college programs, integration of academic and vocational skills, and the development of sequential courses of study that provide students with the optimum educational path for achieving successful employment. National skills standards, developed by industry groups and sponsored by the U. S. Departments of Education and Labor, provide vocational educators with the expectations of employers across the United States. All of these factors are reflected in the framework found in this document.

Each postsecondary program of instruction consists of a program description and a suggested sequence of courses which focus on the development of occupational competencies. Each vocational-technical course in this sequence has been written using a common format which includes the following components:

- Course Name - A common name that will be used by all community/junior colleges in reporting students.
- Course Abbreviation - A common abbreviation that will be used by all community/junior colleges in reporting students.
- Classification - Courses may be classified as:
  - Vocational-technical core - A required vocational-technical course for all students.
  - Vocational-technical elective - An elective vocational-technical course.
  - Related academic course - An academic course which provides academic skills and knowledge directly related to the program area.
  - Academic core - An academic course which is required as part of the requirements for an Associate degree.
- Description - A short narrative which includes the major purpose(s) of the course and the recommended number of hours of lecture and laboratory activities to be conducted each week during a regular semester.

- Prerequisites - A listing of any prerequisite courses that must be taken prior to or on enrollment in the course.
- Competencies and Suggested Objectives - A listing of the competencies (major concepts and performances) and of the suggested student objectives that will enable students to demonstrate mastery of these competencies.

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75 percent of the time allocated to each course. For example, in a four semester hour course consisting of 30 hours lecture and 120 hours of laboratory activities, approximately 22 hours of lecture and 90 hours of lab should be taken by the competencies and suggested objectives identified in the course framework. The remaining 25 percent of each course should be developed at the local district level and may reflect:
  - Additional competencies and objectives within the course related to topics not found in the State framework, including activities related to specific needs of industries in the community college district.
  - Activities which develop a higher level of mastery on the existing competencies and suggested objectives.
  - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed/revised.
  - Activities which implement components of the Mississippi Tech Prep initiative, including integration of academic and vocational-technical skills and coursework, school-to-work transition activities, and articulation of secondary and postsecondary vocational-technical programs.
  - Individualized learning activities, including worksite learning activities, to better prepare individuals in the courses for their chosen occupational area.

- Sequencing of the course within a program is left to the discretion of the local district. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors.

- Programs that offer an Associate of Applied Science degree must include a minimum 15 semester credit hour academic core. Specific courses to be taken within this core are to be determined by the local district. Minimum academic core courses are as follows:

- 3 semester credit hours Math/Science Elective
- 3 semester credit hours Written Communications Elective
- 3 semester credit hours Oral Communications Elective
- 3 semester credit hours Humanities/Fine Arts Elective
- 3 semester credit hours Social/Behavioral Science Elective

It is recommended that courses in the academic core be spaced out over the entire length of the program, so that students complete some academic and vocational-technical courses each semester. Each community/junior college has the discretion to select the actual courses that are required to meet this academic core requirement.

- In instances where secondary programs are directly related to community and junior college programs, competencies and suggested objectives from the high school programs are listed as Baseline Competencies. These competencies and objectives reflect skills and knowledge that are directly related to the community and junior college vocational-technical program. In adopting the curriculum framework, each community and junior college is asked to give assurances that:
  - students who can demonstrate mastery of the Baseline Competencies do not receive duplicate instruction, and
  - students who cannot demonstrate mastery of this content will be given the opportunity to do so.

- The roles of the Baseline Competencies are to:
  - Assist community/junior college personnel in developing articulation agreements with high schools, and
  - Ensure that all community and junior college courses provide a higher level of instruction than their secondary counterparts

- The Baseline Competencies may be taught as special "Introduction" courses for 3-6 semester hours of institutional credit which will not count toward Associate degree requirements. Community and junior colleges may choose to integrate the Baseline Competencies into ongoing courses in lieu of offering the "Introduction" courses or may offer the competencies through special projects or individualized instruction methods.

- Technical elective courses have been included to allow community colleges and students to customize programs to meet the needs of industries and employers in their area.

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PROGRAM DESCRIPTION

MEDICAL LABORATORY TECHNOLOGY

The Medical Laboratory Technology program prepares individuals to work in a medical laboratory under the supervision of a medical technologist or pathologist and/or other physicians. Included are routine laboratory procedures and tasks in the areas of hematology, bacteriology, immunohematology, chemistry, parasitology, serology, and urinalysis.

Upon successful completion of the technical program (not to exceed 24 consecutive months), the student may be awarded an Associate of Applied Science Degree in Medical Laboratory Technology and will be eligible to apply for admission to take a national certification examination.

MEDICAL LABORATORY TECHNOLOGY

SUGGESTED COURSE SEQUENCE*

Baseline Competencies for Medical Laboratory Technology**

FIRST YEAR

3 sch	Written Communications Elective
1 sch	Fundamentals of Medical Laboratory Technology/Phlebotomy (MLT 1111)
2 sch	Urinalysis/Body Fluids (MLT 1212)
3 sch	Hematology I (MLT 1313)
8 sch	Approved Electives†
17 sch	

3 sch	Math/Natural Science Elective
3 sch	Immunology/Serology (MLT 1413)
4 sch	Hematology II (MLT 1324)
4 sch	Approved Electives†
5 sch	Clinical Chemistry (MLT 1515)
19 sch	

SECOND YEAR

3 sch	Humanities/Fine Arts Elective
4 sch	Immunohematology (MLT 2424)
4 sch	Approved Elective†
2 sch	Parasitology (MLT 2612)
4 sch	Pathogenic Microbiology (MLT 2614)
0-3sch	Vocational-Technical Elective††(District option) (MLT 2711, 2713, or 2812)
17-20 sch	

3 sch	Social/Behavioral Science Elective
3 sch	Oral Communications Elective
6 sch	Clinical Practice I (MLT 2916)
6 sch	Clinical Practice II (MLT 2926)
0-3 sch	Vocational-Technical Elective††(District option) (MLT 2711, 2713, or 2812)
18-21 sch	

SUMMER TERM

6 sch	Clinical Practice III (MLT 2936)
1-3 sch	Vocational-Technical Elective†† (MLT 2711, 2713, or 2812)

* Students who lack entry level skills in math, English, science, etc., will be provided related studies.

** Baseline competencies are taken from the high school Allied Health program. Students who can document mastery of these competencies should not receive duplicate instruction. Students who cannot demonstrate mastery will be required to do so.

† APPROVED ELECTIVES - MEDICAL LABORATORY TECHNOLOGY
Anatomy and Physiology I (BIO 1513)
Anatomy and Physiology II (BIO 1523)
General Biology I (BIO 1133)
General Chemistry I (CHE 1213)
General Chemistry Laboratory I (CHE 1211)
General Chemistry II (CHE 1223)
General Chemistry Laboratory II (CHE 1221)
Microbiology (BIO 2924)
Principles of Chemistry I (CHE 1314)
Principles of Chemistry II (CHE 1324)

†† APPROVED VOCATIONAL-TECHNICAL ELECTIVES
MLT Seminar (MLT 2711)
Certification Fundamentals for MLT (MLT 2713)
Clinical Instrumentation (MLT 2812)
(Vocational-Technical Electives may be offered during any semester of the Sophomore year.)

SECTION I:

BASELINE COMPETENCIES

BASELINE COMPETENCIES FOR POSTSECONDARY MEDICAL LABORATORY TECHNOLOGY PROGRAMS

The following competencies and suggested objectives are taken from the publication *Mississippi Curriculum Framework for Secondary Allied Health*. These competencies and objectives represent the baseline for entrance into the postsecondary Medical Laboratory Technology courses. Students enrolled in postsecondary courses should either (1) have documented mastery of these competencies, or (2) be provided with these competencies before studying the advanced competencies in the Medical Laboratory Technology program.

Baseline competencies may be integrated into existing courses in the curriculum or taught as special "Introduction" courses. The "Introduction" courses may be taught for up to six semester hours of institutional credit and may be divided into two courses. If the Baseline Competencies are to be taught as "Introduction" courses, each course should be at least 3 credit hours. The following course number(s) and description should be used:

Course Name(s): Introduction to Medical Laboratory Technology, Introduction to Medical Laboratory Technology I, or Introduction to Medical Laboratory Technology II

Course Abbreviation(s): MLT 100(3-6), MLT 1013, MLT 1023

Classification: Vocational-Technical Core

Description: These courses contain the baseline competencies and suggested objectives from the high school Allied Health curriculum which directly relate to the community college Medical Laboratory Technology program. The courses are designed for students entering the community college who have had no previous training or documented experience in the field. (3-6 semester hours based upon existing skills for each student. May be divided into 2 courses for a maximum total of 6 hours of institutional credit.)

Competencies and Suggested Objectives:

1. Review material related to course and professional organizations.
   a. Identify student and course expectations.
   b. Demonstrate effective teamwork skills.
   Related Academic Topics (See Appendix A): C1, C6
   Workplace Skills (See Appendix B): WP2
2. Apply communications in health care.
   a. Utilize effective communication skills.

Related Academic Topics (See Appendix A): C1, C6
Workplace Skills (See Appendix B): WP2, WP3

3. Explain professional ethics and legal responsibility.
   a. Explain professional ethics and legal responsibility including negligence, malpractice, and health occupation code of conduct.
   b. Define confidentiality.

   Related Academic Topics (See Appendix A): C1, C4, C6
   Workplace Skills (See Appendix B): WP2, WP3
4. Explain client's rights.
   a. Identify ways to promote client's rights and privacy.
   b. Respect client.

   Related Academic Topics (See Appendix A): C1, C6
   Workplace Skills (See Appendix B): WP3
5. Utilize universal precautions.
   a. Explain importance of universal precautions in life practices and health care.
   b. Explain the state and federal government's role in universal precautions.
   c. Relate universal precautions to the transmission of infectious diseases including HIV, AIDS, HBV, and TB.
   d. Demonstrate hand-washing technique.
   e. Demonstrate donning and removing clean gloves.

   Related Academic Topics (See Appendix A): C1, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
6. Recognize safety procedures and policies.
   a. Describe basic safety procedures.
   b. Describe accident prevention methods and disaster plans.
   c. Follow facility policies.

   Related Academic Topics (See Appendix A): C1, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
7. Perform basic safety procedures.
   a. Assist with basic emergency procedures to include falls, seizures, fainting.
   b. Attain Class C certification in cardiopulmonary resuscitation.
   c. Demonstrate procedures of first aid for sudden illness and accidents.
   d. Demonstrate body mechanics.

   Related Academic Topics (See Appendix A): C1, C4, C6, S8
   Workplace Skills (See Appendix B): WP2, WP6
8. Recognize and use medical terminology.
   a. Demonstrate the use of medical references to spell medical terms correctly.
   b. Spell designated medical terms correctly.
   c. Define and divide medical terms into root words, prefixes, and suffixes.
   d. Interpret the common medical abbreviations and symbols including meanings, and uses.

e. Demonstrate the use of medical terms and abbreviations in reading, speaking, interpreting, and writing simulated medical records.

Related Academic Topics (See Appendix A): C1, C4, C5, C6, S1, S8
Workplace Skills (See Appendix B): WP2, WP4

9. Recognize the structure and functions of each organ system and apply related basic skills.
   a. Interpret the basic organization of the body.
   b. Interpret the basic structures and functions of the integumentary system.
   c. Interpret the basic structures and functions of the musculoskeletal system.
   d. Interpret the basic structures and functions of the circulatory system.
      i. Define, locate, and check the four main vital signs.
   e. Interpret the basic structures and functions of the respiratory system.
   f. Interpret the basic structures and functions of the digestive system.
   g. Interpret the basic structures and functions of the urinary system.
   h. Interpret the basic structures and functions of the nervous system.
   i. Interpret the basic structures and functions of the sensory system.
   j. Interpret the basic structures and functions of the reproductive system.
   k. Interpret the basic structures and functions of the endocrine system.

   Related Academic Topics (See Appendix A): C1, C2, C5, C6, M4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP3, WP4

10. Develop patient contact care skills by utilizing medical terminology and basic skills in a health care setting.
   a. Demonstrate how to don and remove sterile gloves using sterile technique.
   b. Demonstrate how to open sterile packages without contaminating contents using sterile technique.
   c. Demonstrate donning and removing isolation mask, eye shields, cap, gown, goggles, and cover shoes according to health care facility policy.
   d. Demonstrate double bagging technique and isolation technique according to health care facility policy.
   e. Define three general principles of isolation, three purposes of isolation, and five types of isolation according to CDC/OSHA guidelines.

   Related Academic Topics (See Appendix A): C1, C2, C4, C6, M4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP3, WP6

11. Assess diagnostic and laboratory health careers by utilizing medical terminology and basic skills in exploring specific diagnostic and laboratory health careers.
   a. Define terms associated with asepsis including root words, prefixes, and suffixes.
   b. Define terms associated with infection control including root words, prefixes, and suffixes.
   c. Describe careers available in the medical laboratory technology field including personal qualities, education requirements, responsibilities, and credentials.

d. Identify ways pathogenic microorganisms are spread in relation to the infection cycle.
e. Describe methods of collecting specimens of urine, stool, sputum, blood, and emesis according to CDC guidelines.
f. Identify basic laboratory tests including those conducted in the health care facility.
g. Simulate methods for collecting specimens according to CDC guidelines.
h. Simulate procedures for performing basic laboratory tests based on National Committee for Clinical Laboratory Standards.

Related Academic Topics (See Appendix A): C1, C4, C6, M1, M4, S1, S8
Workplace Skills (See Appendix B): WP2, WP3, WP6

12. Demonstrate job seeking and job keeping skills.
    a. Prepare a resume containing essential information.
    b. Complete a job application form.
    c. Explain procedures for job interviews.
    d. Demonstrate the role of an applicant in a job interview.
    e. Describe job interview etiquette.
    f. Maintain positive relations with clients and peers.
    g. Demonstrate job keeping skills.

    Related Academic Topics (See Appendix A): C1, C4, C6
    Workplace Skills (See Appendix B): WP2, WP3

SECTION II:

CURRICULUM GUIDE FOR

MEDICAL LABORATORY TECHNOLOGY

MEDICAL LABORATORY TECHNOLOGY COURSES

Course Name: Fundamentals of Medical Laboratory Technology/Phlebotomy

Course Abbreviation: MLT 1111

Classification: Vocational-Technical Core

Description: The course includes an overview of the field of Medical Laboratory Technology, familiarization with laboratory safety, microscopes, glassware, and equipment. It also includes laboratory organization, medical ethics, and employment opportunities. Basic laboratory specimen collection techniques are introduced. (1 sch: 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Explain the relationship between medical ethics and professionalism to the field of clinical laboratory science.
   a. Discuss the history of the clinical laboratory, and state the major organizational structure of the hospital laboratory.
   b. Discuss the importance and impact of medical ethics on patient care, especially confidentiality of test results.
   c. Differentiate between the roles of various health care professionals.
   d. Explain the responsibilities of each classification of laboratory staff.
   e. State the regulatory and professional agencies related to laboratories and discuss their functions.
   f. Discuss employment opportunities available to the graduates of Medical Laboratory Technology Programs.

   Related Academic Topics (See Appendix A): C1, C4, C6
   Workplace Skills (See Appendix B): WP2, WP6
2. Recommend and implement currently approved laboratory safety procedures.
   a. Discuss the common laboratory hazards to include:
      i. Chemical
      ii. Fire
      iii. Biological
      iv. Mechanical
      v. Electrical
   b. Describe and demonstrate the proper method for handling and disposing of biological hazards.
   c. Describe and/or demonstrate the use of basic laboratory safety equipment.
   d. Describe basic first aid procedures.
   e. Explain the appropriate local safety procedures.
   f. Demonstrate compliance with universal precautions.

g. Discuss and select the appropriate isolation technique for various clinical conditions.
h. Demonstrate knowledge of MSDS by reading and interpreting Material Safety Data Sheets.

Related Academic Topics (See Appendix A): C1, C2, C5, S8
Workplace Skills (See Appendix B): WP2, WP6

3. Select and use basic equipment to perform selected laboratory skills.
   a. List the basic tests performed in each of the major departments of the laboratory and explain their purpose.
   b. Perform introductory laboratory skills to include:
      i. Pipetting
      ii. Use and care of glassware
      iii. Use and care of microscopes
      iv. Use and care of other lab equipment

   Related Academic Topics (See Appendix A): C4, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
4. Explain and practice laboratory specimen collection techniques.
   a. Perform basic laboratory specimen collection techniques, including phlebotomy.
   b. Demonstrate protocols used in identification of specimens and the procedures used to maintain accurate patient identity.
   c. Discuss complications encountered in specimen collection.
   d. Select an appropriate method of resolving problems of specimen collection.
   e. Employ measures to maintain patient confidentiality.

   Related Academic Topics (See Appendix A): C4, C5, S1, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Urinalysis/Body Fluids

Course Abbreviation: MLT 1212

Classification: Vocational-Technical Core

Description: This course is an introduction to urinalysis and laboratory analysis of miscellaneous body fluids. It includes the basic principles of routine and special urine tests, and specimen examination through laboratory work. Theory and test profiles are also presented for miscellaneous body fluids with correlation to diseased states. (2 sch: 1 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Describe the formation and composition of urine.
   a. Discuss the history and importance of urinalysis.
   b. Describe the functioning unit of the kidney.
   c. Trace the formation of urine.
   d. Discuss the special urinalysis screening test.

   Related Academic Topics (See Appendix A): C1, C2, C3, S1, S8
   Workplace Skills (See Appendix B): WP2, WP6
2. Explain the properties involved in the physical, chemical, and microscopic examinations of urine.
   a. List and describe the physical characteristics of urine.
   b. List and describe the chemical characteristics of urine.
   c. Identify the microscopic elements of urine.
   d. Describe specimen collection and handling of urines to include:
      i. special instructions to patient
      ii. labeling of specimen
      iii. specimen containers
      iv. specimen preservation

   Related Academic Topics (See Appendix A): C2, C4, M4, S1, S5, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Perform the testing involved in the physical, chemical, and microscopic examinations of urine.
   a. Perform the physical examination of urine including color, clarity, and specific gravity.
   b. List and describe the principles of the reactions of the reagent strip testing of urinalysis.
   c. Interpret chemical reactions of reagent strips.
   d. Identify microscopic elements in the urine.

e. Correlate disease states with abnormal physical, chemical, and microscopic results.

Related Academic Topics (See Appendix A): C2, C4, M4, S1, S5, S8
Workplace Skills (See Appendix B): WP2, WP5, WP6

4. Describe the laboratory testing and the formation of other body fluids (i.e., synovial, CSF, seminal, serous body fluids, amniotic fluids, etc.).
   a. List and describe physical, chemical, and microscopic tests performed on the following body fluids: synovial, CSF, seminal body fluids, serous body fluids, and amniotic fluids.
   b. Correlate abnormal test results with disease states.

   Related Academic Topics (See Appendix A): C1, C2, C3, M4, S1, S5, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Hematology I

Course Abbreviation: MLT 1313

Classification: Vocational-Technical Core

Description: This course is a study of the function of blood, morphology, and maturation of normal cells, blood cell counts, differentials of white cells, and blood collection and handling. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Discuss and identify the origin and characteristics of normal blood cell lines.
   a. Identify sites of hematopoiesis.
   b. Outline the development of the blood cell lines to include:
      i. erythrocytes
      ii. myelocytes
      iii. lymphocytes
      iv. monocytes
      v. megakaryocytes
   c. Differentiate cellular characteristics of developmental stages of each type of cell line.

   Related Academic Topics (See Appendix A): C2, C4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP6
2. Perform routine manual and automated hematology procedures.
   a. State the principle of routine manual and automated hematology procedures.
   b. Prepare, stain, and evaluate manual peripheral blood smears.
   c. Perform manual and automated cell counts.
   d. Perform manual and automated hemoglobin and hematocrit determinations.
   e. Calculate RBC indices.
   f. Correlate RBC indices with RBC morphology.
   g. Identify normal reference ranges for hematologic test procedures.

   Related Academic Topics (See Appendix A): C4, M3, M4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Explain the role of hematology safety and quality control.
   a. Demonstrate appropriate hematology safety techniques.

   Related Academic Topics (See Appendix A): C1, C2, C6, M6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

4. Explain and perform quality control procedures and interpret data.
   a. Explain the quality control techniques used for routine hematology procedures.
   b. Perform quality control procedures.
   c. Record and interpret quality control data.
   d. Analyze quality control data to determine validity of hematology lab test results.

   Related Academic Topics (See Appendix A): C1, C2, C6, M6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
5. Correlate clinical conditions with hematology test results.
   a. Assess physiologic and pathologic causes for variations in hematologic data.

   Related Academic Topics (See Appendix A): C4, C6, M4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Immunology/Serology

Course Abbreviation: MLT 1413

Classification: Vocational-Technical Core

Description: This course includes basic principles of serology/immunology, theory and performance of routine serology tests. (3 sch: 2 hr. lecture, 2 hr. lab)

Prerequisites: None

Competencies and Suggested Objectives:

1. Describe the body's immune defenses.
   a. Explain the principal mechanisms of acquired and natural immunity.
   b. Name the cells of the immune system and explain the function.
   c. Name the components of natural immunity and the functions .
   d. List the characteristics of antigens.
   e. Describe the primary immune response.
   f. Describe the secondary immune response.
   g. Differentiate among the five immunoglobulin classes and their functions.
   h. Outline the sequential steps of the complement classical and alternate pathways.
   i. Describe biologic functions associated with complement activation.

   Related Academic Topics (See Appendix A): C2, C6, S1, S8
   Workplace Skills (See Appendix B): WP2, WP6
2. Describe the principles of immunoassays.
   a. Explain the principle of the commonly used immunoassays.
   b. Assess physiologic and pathologic causes for variation in expected test results.
   c. Assess test results to identify and correct technical sources of error.

   Related Academic Topics (See Appendix A): C4, M4, S6, S8
   Workplace Skills (See Appendix B): WP2, Wp5, WP6
3. Perform routine immunology/serology procedures with emphasis on accuracy and precision.
   a. Perform the commonly used immunoassay procedures.
   b. Demonstrate the use of proper quality control methods for each testing procedure.
   c. Interpret the validity of patient test results based on control values.
   d. Prepare accurate and simple serial dilutions.
   e. Calculate specimen concentrations involved in simple and serial dilutions.

   Related Academic Topics (See Appendix A): C4, M1, M3, M4
   Workplace Skills (See Appendix B): WP2, WP5, WP6

4. Correlate results of immunological procedures with clinical conditions.
   a. State the expected serologic test results for commonly encountered clinical conditions.
   b. Assess causes of false positive and false negative test results.

   Related Academic Topics (See Appendix A): C4, C6, M4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Hematology II

Course Abbreviation: MLT 1324

Classification: Vocational-Technical Core

Description: This course includes the study of abnormal cell morphology and diseases involving blood cells, test procedures used in laboratory diagnosis of hematological disease, normal and abnormal hemostasis, and diagnostic procedures for evaluation of bleeding abnormalities and anticoagulant therapy. (4 sch: 2 hr. lecture, 4 hr. lab)

Prerequisites: Hematology I (MLT 1313)

Competencies and Suggested Objectives:

1. Discuss and identify the origin and characteristics of abnormal blood cells.
   a. Identify and describe physiology of each type of leukocyte.
   b. Describe RBC production and hemoglobin synthesis to include RBC biochemistry.
   c. Identify abnormal RBC and WBC morphology, inclusions, and special stains.
   d. Evaluate platelets to include number and morphology.

   Related Academic Topics (See Appendix A): C2, C6, S1, S8
   Workplace Skills (See Appendix B): WP2, WP6
2. Correlate clinical conditions with abnormal hematology laboratory results.
   a. Calculate and correlate RBC indices with microscopic morphology and disease states.
   b. Assess lab data to identify major types of anemia.
   c. Recognize leukemic cells and assess lab data in major types of leukemia.
   d. Discuss the clinical manifestations and cause for each hemostatic disease.

   Related Academic Topics (See Appendix A): C4, C6, M4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Describe the interaction of blood vessels, platelets, coagulation factors, and fibrinolytic systems in normal and abnormal hemostasis.
   a. Describe the production and characteristics of coagulation factors.
   b. Identify expected coagulation test data for diagnosis and treatment of hemostatic disorders.
   c. Explain the action and laboratory monitoring of anticoagulants in therapy of thrombotic disease.

   Related Academic Topics (See Appendix A): C1, C4, C6, M4, S1, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

4. Perform and interpret manual and automated hematology coagulation procedures.
   a. State the principle and perform manual and automated procedures.
   b. Operate and interpret results from hematology and coagulant instruments.
   c. Assess results to identify sources of errors.
   d. Propose solutions to correct erroneous results.
   e. Interpret quality control data to assess validity of patient results.

   Related Academic Topics (See Appendix A): C2, C4, M3, M4, S1, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Clinical Chemistry

Course Abbreviation: MLT 1515

Classification: Vocational-Technical Core

Description: This course is the study of human biochemistry as an aid in the diagnosis of disease processes. It includes chemistry procedures performed on body fluids for aiding in diagnosis of disease processes. (5 sch: 3 hr. lecture, 4 hr. lab)

Prerequisite: 4 hours of approved Chemistry electives

Competencies and Suggested Objectives:

1. Describe chemistry test methods used to measure substances in the blood and other body fluids.
   a. Identify special safety procedures unique to clinical chemistry.
   b. Identify and discuss collection procedures and processing of specimens in clinical chemistry.
   c. Describe the principles of selected chemistry methods to include:
      i. spectral techniques
      ii. competitive binding
      iii. ion-selective electrodes
   d. Discuss the uses of computerization in clinical chemistry including specimen identification and data management.

   Related Academic Topics (See Appendix A): C1, C2, C6, M1, M2, M3, M4, S1, S5, S6, S8

   Workplace Skills (See Appendix B): P2, WP5, WP6
2. Correlate health and disease states with chemistry test results.
   a. List and describe diseases and chemistry test results associated with abnormal metabolism including carbohydrate, protein, and lipids.
   b. List and describe diseases and chemistry test results associated with abnormal function including liver, kidney, heart, and endocrine.

   Related Academic Topics (See Appendix A): C4, C6, M4, S1, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Perform laboratory tests outlined by the test manufacturer to determine the presence and/or amount of substances(s) in the blood and other body fluids.
   a. Perform selected chemistry tests including manual and semi-automated methods.
   b. Demonstrate the operating techniques of the equipment used in the clinical chemistry laboratory, with emphasis on accuracy and precision.
   c. Demonstrate calibration of selected instruments and test equipment.
   d. Indicate when to refer to an appropriate source for repairs or consultation.

e. Demonstrate on a computer: data input, storage, and retrieval.

Related Academic Topics (See Appendix A): C2, C4, M3, M4, S1, S5, S6, S8
Workplace Skills (See Appendix B): WP2, WP5, WP6

4. Solve laboratory mathematics problems.
   a. Identify and utilize the basic units of measure in the metric system.
   b. Convert metric units to English units and vice versa.
   c. List and perform dilution calculations.
   d. List and utilize different methods used to state concentrations of substances in clinical chemistry.

   Related Academic Topics (See Appendix A): C2, C4, M1, M2, M3, M4, S8
   Workplace Skills (See Appendix B): WP2, WP6
5. Perform quality control procedures as used in the clinical chemistry laboratory with emphasize on accuracy and precision.
   a. List and describe various statistical methods used in clinical chemistry.
   b. Prepare quality control specimens, and perform selected assays on QC specimens, and record results.
   c. Interpret quality control data on selected clinical chemistry procedures.
   d. Document corrective action taken in troubleshooting instruments and out-of-range QC values.

   Related Academic Topics (See Appendix A): C1, C2, C6, M6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Immunohematology

Course Abbreviation: MLT 2424

Classification: Vocational-Technical Core

Description: This course includes collection, processing, storage, and utilization of blood components. It also includes the study of immunological principles and procedures for blood typing, cross matching, antibody detection, identification, and investigation of hemolytic disease of the newborn. (4 sch: 2 hr. lecture, 4 hr. lab)

Prerequisite: Immunology/Serology (MLT 1413)

Competencies and Suggested Objectives:

1. Relate principles of immunology to immunohematology.
   a. Correlate the immunologic response to the immunohematology theory.
   b. State antigen and antibody characteristics with reactions in various medium and temperatures.

   Related Academic Topics (See Appendix A): C2, C6, S1, S8
   Workplace Skills (See Appendix B): WP2, WP6
2. Perform basic procedures used in a blood bank laboratory.
   a. Assess patient condition to select required procedures for immunohematology.
   b. Perform and interpret routine patient testing.
   c. Apply the principles of immunohematology to the procedures used in a blood bank laboratory.

   Related Academic Topics (See Appendix A): C4, M1, M3, M4, S1, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Assess component utilization in transfusion therapy.
   a. Explain techniques for collection, processing, storage, and shipment of blood components.
   b. Identify blood component of choice for transfusion therapy.
   c. Select pre-transfusion compatibility testing procedures required for component therapy.
   d. Identify types of transfusion reactions and perform investigative testing.
   e. Assess and perform appropriate tests in investigation of transfusion reactions.

   Related Academic Topics (See Appendix A): C1, C4, M1, M4, S1, S8
   Workplace Skills (See Appendix B): WP2, WP6
4. Describe basic concepts of genetics.
   a. Apply basic concepts of genetics to various blood group systems.
   b. Evaluate and interpret inheritance from results of blood bank procedures.

c. Determine statistical probability in inheritance of a given characteristic in an individual.

Related Academic Topics (See Appendix A): C1, C6, M6, S1, S7, S8
Workplace Skills (See Appendix B): WP2, WP6

5. Explain, perform, and interpret quality control in the blood bank laboratory.
   a. Identify and perform the daily quality assurance practices and safety practices used in the blood bank.
   b. Identify sources of error and recommend corrective procedures.
   c. Assess physiologic and pathologic causes for discrepant test results.
   d. Select and employ safe transfusion practices in the presence of unusual test results.

   Related Academic Topics (See Appendix A): C1, C2, C6, M6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Parasitology

Course Abbreviation: MLT 2612

Classification: Vocational-Technical Core

Description: This course covers the morphology, physiology, life cycles, and epidemiology of parasites of animals with emphasis on human pathogenic parasites. Identification of the parasites from human material is also included. (2 sch: 1 hr. lecture, 2 hr. lab)

Prerequisite: None

Competencies and Suggested Objectives:

1. Describe the life cycle of medically important parasites.
   a. Describe the modes of infection for medically important parasites.
   b. Recognize the diagnostic stages of medically important parasites.

   Related Academic Topics (See Appendix A): C2, C4, S1, S2, S8
   Workplace Skills (See Appendix B): WP2, WP6
2. Discuss isolation and identification techniques used in a clinical parasitology laboratory.
   a. Identify the various body fluids that might be examined for the presence of parasites.
   b. Describe the use of concentration techniques in parasitology.
   c. Describe the microscopic techniques used to identify medically important parasites.

   Related Academic Topics (See Appendix A): C1, C2, C6, M1, S1, S2, S8
   Workplace Skills (See Appendix B): WP2, WP6
3. Identify medically important parasites.
   a. Correlate test results with clinical conditions.
   b. Correlate other laboratory findings with results in the parasitology laboratory.

   Related Academic Topics (See Appendix A): C2, C6, S1, S2, S8
   Workplace Skills (See Appendix B): WP2, WP6

Course Name: Pathogenic Microbiology

Course Abbreviation: MLT 2614

Classification: Vocational-Technical Core

Description: Basic skills, principles, and techniques for the staining, culturing, isolation, and identification of microorganisms of medical importance are emphasized in this course. Included are techniques used in determining the sensitivity of pathogenic bacteria to different antibiotic and other drugs. (4 sch: 2 hr. lecture, 4 hr. lab)

Prerequisites: 4 sch of approved Microbiology electives

Competencies and Suggested Objectives:

1. Discuss transmission methods of disease and host susceptibility.
   a. Describe the various ways that diseases are transmitted.
   b. Identify conditions that lead to increased host susceptibility.
   Related Academic Topics (See Appendix A): C1, C2, C6, S1, S2, S8
   Workplace Skills (See Appendix B): WP2, WP6
2. Identify organisms of medical importance, and correlate results with reading of plates, gram stain reactions, and biochemical studies.
   a. Correlate laboratory test results with clinical conditions.
   b. Evaluate gram stain, colony morphology, and biological and differential tests for identification of pathogenic organisms including AFB and fungus.
   c. Perform tests and recognize criteria for identification of pathogenic organisms including AFB and fungus.
   d. Identify normal flora at various body sites.
   Related Academic Topics (See Appendix A): C2, C6, S1, S2, S8
   Workplace Skills (See Appendix B): WP2, WP6
3. Perform susceptibility testing.
   a. Compare and contrast the various in-vitro methods for determining antimicrobial susceptibility.
   b. Interpret results of in-vitro susceptibility tests as resistant, intermediate, and susceptible.
   Related Academic Topics (See Appendix A): C4, M1, M3, M4, S1, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
4. Perform safety, QC, and infection control practices of the microbiology laboratory.
   a. Perform routine diagnostic microbiologic testing using aseptic techniques.
   b. Explain and follow safety and universal precautions that are followed (related to) in the microbiology laboratory.

c. Perform routine QC procedures.

Related Academic Topics (See Appendix A): C1, C2, C6, M6, S8
Workplace Skills (See Appendix B): WP2, WP5, WP6

5. Explain the principle and operation of automated instrumentation.
   a. List examples and uses of automated instrumentation for a microbiology laboratory.

Related Academic Topics (See Appendix A): C4, M4, S1, S6, S8
Workplace Skills (See Appendix B): WP2, WP5, WP6

6. Explain procedure used for collection of microbiologic specimens from various body sites.
   a. Describe appropriate specimen containers for aseptic collection of microspecimens.

Related Academic Topics (See Appendix A): C4, S6, S8
Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: MLT Seminar

Course Abbreviation: MLT 2711

Classification: Vocational-Technical Elective

Description: This course represents a synthesis of previous didactic, laboratory, and clinical experiences. Students will select and present a case study. Recognition of the importance of employability skills after graduation is included. (1 sch: 2 hr. lab)

Prerequisites: All first year MLT courses

Competencies and Suggested Objectives:

1. Present and critique various case studies.
   a. Identify patient from laboratory or clinical experiences with an interesting diagnosis and a clinical course that includes medical laboratory work.
   b. Present case study to a peer audience.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, C5, C6, S1
   Workplace Skills (See Appendix B): WP2, WP6
2. Complete a mock certification exam.
   a. Attain a passing score on a mock exam.
   b. Utilize test results to identify areas of knowledge that should be targeted for further study in preparation for certification exam.

   Related Academic Topics (See Appendix A): C1, C2, C4, C6, M7, S1
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Demonstrate an understanding of the skills required for successful employment.
   a. Demonstrate effective planning and time management skills.
   b. Demonstrate an understanding of the supervisory process and performance evaluations.
   c. Delineate the importance of policies and procedures in the provision of patient care.
   d. Delineate the importance of continuous performance improvement activities.

   Related Academic Topics (See Appendix A): C1, C2, C4, C6
   Workplace Skills (See Appendix B): WP1, WP2, WP6

Course Name: Certification Fundamentals for MLT

Course Abbreviation: MLT 2713

Classification: Vocational-Technical Elective

Description: This course is an in-depth study and review of material covered in the MLT curriculum. Designed to prepare student for the national registry/certifying exams. (3 sch: 3 hr. lecture)

Prerequisites: Clinical Practice I (MLT 2916) and Clinical Practice II (MLT 2926)

Competencies and Suggested Objectives:

1. Correlate laboratory skills from areas with knowledge obtained from didactic and clinical experiences.
   a. Recognize and relate disease states with abnormal test results.
   b. Demonstrate acceptable proficiency in the cognitive level on all areas tested.
   c. Recognize color plate visuals and correlate with each area studied.

   Related Academic Topics (See Appendix A): C1, C3, C4, C6, S2, S5, S8
   Workplace Skills (See Appendix B): WP4, WP6
2. Compare student's pre-testing results in each area with post-testing results.
   a. Recognize weak areas in knowledge and application.
   b. Diagnose strengths and weaknesses in each area by evaluating test results.

   Related Academic Topics (See Appendix A): C1, C4, C5, S2, S8
   Workplace Skills (See Appendix B): WP4, WP6
3. Practice computer constructed tests by using computer software.
   a. Develop computer skills to enable improved test taking strategies.
   b. Analyze the computer-aided testing results and formulate correct responses.

   Related Academic Topics (See Appendix A): C1, C3, C5, S2, S5, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
4. Correlate registry/certifying item descriptor list with curriculum content.
   a. Compare registry/certifying item descriptor list with the content of task areas tested.
   b. Construct test questions to correlate with item descriptor list.
   c. Recognize the three taxonomic levels and practice the utilization of each level.

   Related Academic Topics (See Appendix A): C1, C4, C5, C6, M3, M4, M6, S2, S5, S6
   Workplace Skills (See Appendix B): WP2, WP4, WP6

Course Name: Clinical Instrumentation

Course Abbreviation: MLT 2812

Classification: Vocational-Technical Elective

Description: A review of various types of instruments found in the clinical laboratory is emphasized in this course. Included are operation, calibration, quality control, and troubleshooting. (2 sch: 2 hr. lecture)

Prerequisites: None

Competencies and Suggested Objectives:

1. Describe light and instruments that measure light including spectrophotometer, nephelometer, and fluorometer.
   a. State the relationship between the energy of a photon, frequency, and wavelength.
   b. Recognize the approximate wavelengths represented by the following portions of the spectrum: ultraviolet, visible light, and infrared.
   c. Describe absorbance/transmittance of wavelengths of light as they pass through a colored solution.
   d. Define "stray light."
   e. State Beer's Law and factors that must be true for Beer's Law to be operable.
   f. Be able to calculate from the formula $\frac{Cu}{Cs} = \frac{Au}{As}$ when given the concentration of the standard and the absorbance of the standard and the unknown.
   g. List and diagram the major components of a single-beam spectrophotometer and identify the function of each.
   e. Explain the use of the major components of a single-beam spectrophotometer.
   f. Define band pass and describe its relationship to instrument performance.
   f. Give a stepwise description of the procedure for using a spectrophotometer.
   g. List and give examples of types of in-vitro interferences with spectral analysis.
   h. State methods by which each type of interference with spectral analysis may be minimized.
   i. Define the purpose of a blank, and list the types of blanks used.
   j. Describe the importance of the sample cuvette and the characteristics of a quality cuvette (including the type needed for UV assays).

k. State three function checks performed on any instrument that contains a spectrophotometer, and explain the purpose of each.
l. Explain the value of the principle of calorimetric techniques being the basis of modern automated clinical chemistry procedures and instrumentation.

Related Academic Topics (See Appendix A): C1, C2, C5, C6, M1, M3, S5, S6, S8

Workplace Skills (See Appendix B): WP2, WP5, WP6

2. Describe instruments that require other spectral techniques.
   a. For each of the following instruments, state the principle of operation, the basic components, the function, advantages, limitations, and sources of error: flame emission spectrophotometer and fluorometer.
   b. Draw and properly label a diagram of a flame emission spectrophotometer and a fluorometer.
   c. Explain internal standardization as used in flame photometry.
   d. Compare and contrast the principles, sensitivities, and limitations of nephelometry and turbidimetry.
   e. Explain the principles of refractivity.
   f. Discuss detector limitations and in-vitro interferences as they affect fluorometry and propose methods by which each may be minimized.

   Related Academic Topics (See Appendix A): C1, C2, C6, S5, S6, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Describe electrophoresis techniques performed in the laboratory.
   a. Explain the principle of electrophoresis.
   b. Describe the effect of the following on the movement of a particle through an electrical field:
      iv. viscosity of solvent
      v. size and shape of particle
      vi. charge of particle
      vii. pH of solution
   c. Give the charge properties of amphoteric substances at acidic, isoelectric, and basic pH.
   d. List three common stains for visualizing proteins.
   e. Define the spectrophotometric process of quantitation of separated bands on the support medium.
   f. Describe the technique of immunoelectrophoresis.
   g. Identify concerns associated with the electrophoresis technique that may affect pattern interpretation.

   Related Academic Topics (See Appendix A): C1, C2, C6, S5, S6, S8

   Workplace Skills (See Appendix B): WP2, WP5, WP6
4. Explain the principle of chromatography.
   a. Give the principle of chromatography.
   b. Describe column, paper, and thin-layer chromatography.

c. Describe ion-exchange and gel permeation separation performed on a column.
d. State the formula to calculate the Rf value and what the Rf value is used for.
e. State the use in column chromatography of each of the following chromatographic calculations upon the resolution of chromatographic separation:
   i. retention time
   ii. retention volume
f. List three basic steps in sample preparation for chromatography and provide a reason for each step.
g. Diagram a basic setup of liquid-solid chromatography procedure.
h. State how peak height or area on a chromatogram may be used to quantitate a substance in liquid or gas chromatography.
i. Tell the types of samples for which gas chromatography are most appropriate.
j. State the function of a carrier gas and name three common carrier gasses.

Related Academic Topics (See Appendix A): C1, C2, C6, M1, M3, S5, S6, S8
Workplace Skills (See Appendix B): WP2, WP5, WP6

5. Describe the principle of electrochemical measurements.
   a. Define anode, cathode, potential, and potentiometry.
   b. Name three types of reference electrodes; state their compositions and the theory of the reference electrode.
   c. Explain the principle of operation of a pH electrode and diagram the parts of a combination type electrode.
   d. Diagram and explain the operation of a PO2 electrode and a PCO2 electrode.
   e. Diagram and explain the operation of an ion-selective electrode.
   f. Identify maintenance procedures used on these electrodes to insure proper working conditions.

   Related Academic Topics (See Appendix A): C1, C2, C6, S5, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
6. Discuss the use of radioactive isotopes in the laboratory.
   a. Define half-life, curie, and isotope.
   b. Explain why isotopes are useful in clinical chemistry.
   c. Describe the basic structure of an atom.
   d. Give the atomic number and mass for Carbon-14.
   e. Define and describe the following modes of radioactive decay, including the penetrating ability of each:
      i. alpha particle emission
      ii. beta particle emission
      iii. gamma ray emission
   f. List the instruments used to detect radioactive isotopes, and which type of decay they will detect.

g. Identify radiation safety practices that should be used for personnel, work areas, and waste disposal.

Related Academic Topics (See Appendix A): C1, C2, C6, M1, S5, S6, S8
Workplace Skills (See Appendix B): WP2, WP6

7. Describe the principles of immunochemical techniques.
   a. Define ligand (antigen), binding protein (antibody), and label.
   b. Define and describe competitive binding assays.
   c. List three common markers used to label ligands or binding proteins, and state the instrument that would be used to detect each type of label.
   d. Tell what effect cross reactivity would have on competitive binding assays.
   e. Outline the principle of each of the following: radioimmunoassay (RIA) and enzyme-linked immunoabsorbant assay (ELISA).
   f. Describe the EIA sandwich technique.
   g. Define "dose response curve," and then draw the "bound cpm" and the "free cpm" dose response curves in RIA.
   h. Compare the sensitivity and specificity of EIA or RIA techniques to spectral techniques in order to justify instrument selection for a laboratory.

   Related Academic Topics (See Appendix A): C1, C2, C6, M2, S5, S8
   Workplace Skills (See Appendix B): WP2, WP6

8. Describe the principles of osmometry.
   a. Define osmosis, osmotic pressure, and osmolality.
   b. State the purposes for performing plasma and urine osmolality determinations.
   c. Describe the techniques of freezing point depression and vapor pressure depression for osmolality determinations.
   d. List the colligative properties of particle containing solutions.

   Related Academic Topics (See Appendix A): C1, C2, C6, M1, M2, S5, S6, S8
   Workplace Skills (See Appendix B): WP2, WP6

9. Discuss the basic principles of automation in the laboratory.
   a. List the five major steps of sample analysis in clinical chemistry and tell how these may be adapted to automation.
   b. Define carry-over and tell how it occurs and possible ways it may be eliminated in automation.
   c. Define the following:
      i. selective
      ii. discrete
      iii. continuous flow
      iv. batch analyzer
      v. centrifugal analyzer
      vi. dwell time

d. Assist in writing a proposal to justify instrument purchases for a laboratory, comparing and contrasting different analyzers.

Related Academic Topics (See Appendix A): C1, C2, C5, C6, S5, S8
Workplace Skills (See Appendix B): WP2, WP6

10. List and describe the use of a laboratory information system.
    a. Define the following terms: hardware, software, and interfacing.
    b. Outline the function of the following three elements of computer hardware:
        i. central processing unit
        ii. memory
        iii. input/output devices
    c. List the types of input/output devices and their functions.
    d. State the difference between random-access memory and read-only memory.
    e. Compare and contrast the following forms of on-line storage: hard disk drives and floppy disk drives.
    f. List and give examples of the four major applications of computers to the clinical lab.
    g. Identify three situations in which computers may help and/or hurt with patient quality assurance.

    Related Academic Topics (See Appendix A): C1, C2, C6, S8
    Workplace Skills (See Appendix B): WP2, WP4, WP6
11. Describe basic automated hematology instrumentation.
    a. State the Coulter Principle of electrical impedance.
    b. State the principle used in laser light detection of cells in solutions.
    c. State the method of hemoglobinometry used in automated hematology systems.
    d. Interpret the data generated as histograms by the Coulter S-plus series instruments to achieve an automated three part WBC differential.

    Related Academic Topics (See Appendix A): C1, C2, C6, M1, M2, M3, S6, S8
    Workplace Skills (See Appendix B): WP2, WP5, WP6
12. Discuss routine maintenance, quality control, and troubleshooting procedures.
    a. Describe the purpose of routine preventive maintenance on laboratory instruments.
    b. List four types of preventive maintenance performed in the laboratory.
    c. Identify four pertinent factors in evaluating instruments to purchase for the clinical laboratory.
    d. Define the proper use, function, and maintenance of each of the following basic laboratory instruments:
        i. balance
        ii. centrifuge
        iii. water bath
        iv. autoclave

v. incubator
vi. pipetting devices

e. Explain the process of calibration of selected laboratory instruments.
   i. Describe calibration procedures for a given method on a selected laboratory instrument.
   ii. Describe verification procedures for a given method on a selected laboratory instrument.

f. Describe basic quality control and troubleshooting procedures.
   i. Differentiate internal and external QC programs.
   ii. Define and discuss troubleshooting procedures.

Related Academic Topics (See Appendix A): C1, C2, C5, C6, M1, M2, M3, M6, S8

Workplace Skills (See Appendix B): WP2, WP5, WP6

Course Name: Clinical Practice I, II, III

Course Abbreviation: MLT 2916, MLT 2926, MLT 2936

Classification: Vocational-Technical Core

Description: This course includes clinical practice and didactic instruction in a clinical affiliate. Areas covered are hematology, clinical chemistry, immunohematology, urinalysis, microbiology, coagulation, and serology. (6-18 sch: 18-54 hr. clinical)

Prerequisites: Vocational-technical core courses

Competencies and Suggested Objectives:

1. Process and collect specimens for testing and analysis.
   a. Determine the suitability of specimens submitted for standard laboratory testing.
   b. Use appropriate protective techniques in collection and processing of laboratory samples.

   Related Academic Topics (See Appendix A): C4, S2, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
2. Perform analytical examinations on cellular products and body fluids.
   a. Analyze laboratory specimens according to the laboratory procedure manual.
   b. Apply basic scientific principles in learning new methodologies and techniques.
   c. Correlate laboratory findings with disease.

   Related Academic Topics (See Appendix A): C2, C4, M3, M4, S1, S5, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
3. Recognize factors that affect testing procedures and results, and take action when predetermined limits are exceeded.
   a. Specify technical factors influencing test results.
   b. Assess physical and pathologic causes for variation in test results.
   c. Interpret laboratory data and follow established protocol when predetermined limits are exceeded.

   Related Academic Topics (See Appendix A): C4, C6, M1, M4, S1, S5, S6, S8
   Workplace Skills (See Appendix B): WP2, WP5, WP6
4. Participate in an established quality control program.
   a. Maintain and monitor an effective quality control program according to laboratory protocol.
   b. Interpret and evaluate quality control data to determine validity of patient test results.
   c. Explain corrective action according to laboratory protocol.

d. Maintain preventive and corrective maintenance on laboratory equipment and instrumentation, including referral to an appropriate source for repairs and consultation.

Related Academic Topics (See Appendix A): C1, C2, C6, M6, S8
Workplace Skills (See Appendix B): WP2, WP5, WP6

5. Demonstrate professional conduct, communication, and interpersonal relations with laboratory personnel, patients, other health care professionals, as well as with the public.
   a. Interact and communicate with other laboratory and health care professionals to aid in patient care.
   b. Recognize the importance of continuing education as a ongoing process.
   c. Practice measures to protect confidentiality of patient test data.

   Related Academic Topics (See Appendix A): C3, C5, C6, S8
   Workplace Skills (See Appendix B): WP2, WP3, WP5, WP6

RELATED ACADEMIC COURSES

Course Name: Anatomy and Physiology I

Course Abbreviation: BIO 1513

Classification: Related Academic

Description: A lecture/laboratory course dealing with the anatomical and physiological study of the human body, particularly the molecular, cellular, tissue, organs, and systems. Each system is considered in detail regarding both structure and function.

Course Name: Anatomy and Physiology II

Course Abbreviation: BIO 1523

Classification: Related Academic

Description: A lecture/laboratory course of the systems listed but not covered in BIO 1513.

Course Name: General Biology I

Course Abbreviation: BIO 1133

Classification: Related Academic

Description: A lecture/laboratory course in basic biological principles including chemical and cellular basis of life, anatomy and physiology, reproduction, genetics, organismal complexity, classification, biosocial problems and ecology.

Course Name: General Chemistry I

Course Abbreviation: CHE 1213

Classification: Related Academic

Description: Atomic and molecular structure, periodicity and atomic properties, stoichiometry, the male concept, types of solutions, energy-enthalpy.

Pre/Corequisites: General Chemistry Laboratory I (CHE 1211) must be scheduled concurrently.

Course Name: General Chemistry Laboratory I

Course Abbreviation: CHE 1211

Classification: Related Academic

Description: Must be taken concurrently in phase with the lecture sequence. Selected experiments to illustrate the principles taught in lecture.

Pre/Corequisites: General Chemistry I (CHE 1213) must be scheduled concurrently.

Course Name: General Chemistry II

Course Abbreviation: CHE 1223

Classification: Related Academic

Description: Gases, kinetics, equilibria, thermodynamics, electrochemistry, nuclear chemistry, coordination and compounds.

Pre/corequisites: General Chemistry I (CHE 1213) and General Chemistry Laboratory I (CHE 1211); General Chemistry Laboratory II (CHE 1221) must be scheduled concurrently.

Course Name: General Chemistry Laboratory II

Course Abbreviation: CHE 1221

Classification: Related Academic

Description: A continuation of General Chemistry Laboratory I (CHE 1211). Must be taken concurrently in phase with the lecture sequence.

Prerequisites: General Chemistry I (CHE 1213)and General Chemistry Laboratory I (CHE 1211); General Chemistry II (CHE 1223) must be scheduled concurrently.

Course Name: Microbiology

Course Abbreviation: BIO 2924

Classification: Related Academic

Description: A lecture/laboratory course providing a survey of the microbes (microscopic organisms) with emphasis and detailed study being placed on those affecting other forms of life, especially man. Laboratory is devoted to basic techniques of microbial study, such as identification, control, morphology, physiology, life cycles, and culture techniques.

Prerequisites: General Chemistry I (CHE 1213) and General Biology I (BIO 1133) are highly recommended.

Course Name: Principles of Chemistry I

Course Abbreviation: CHE 1314

Classification: Related Academic

Description: Emphasis on properties of matter and application of principles. Primarily for students in pre-nursing, home economics, agriculture, and physical education.

Course Name: Principles of Chemistry II

Course Abbreviation: CHE 1324

Classification: Related Academic

Description: A continuation of Principles of Chemistry I (CHE 1314). Emphasis on systematic semimicro analysis of cations and anions.

Prerequisites: Principles of Chemistry I (CHE 1314)

SECTION III:

RECOMMENDED TOOLS AND EQUIPMENT

RECOMMENDED TOOLS AND EQUIPMENT FOR MEDICAL LABORATORY TECHNOLOGY

1. Analyzer, Chemistry, Dry Slide (1 per program)
2. Analyzer, Chemistry, Wet Reagents (1 per program)
3. Analyzer Chemistry Ion Specific Electrode (1 per program)
4. Analyzer, Coagulation (1 per program)
5. Analyzer, Electrophoresis (1 per program)
6. Analyzer, Hematology (1 per program)
7. Analyzer, Urine Chemistry (1 per program)
8. Arms (1 per 4 students)
9. Autoclave (1 per program)
10. Bath, Water (1 per 5 students)
11. Blanket, Fire (1 per lab)
12. Box, Rh View (1 per 5 students)
13. Cabinet, Biological Safety (1 per program)
14. Cabinet, Flammable (1 per program)
15. Centrifuge, Cell Washer (1 per lab)
16. Centrifuge, General Lab (2 per lab)
17. Centrifuge, Immunological (1 per student)
18. Centrifuge, Microhematocrit (1 per lab)
19. Chair, Blood Drawing (1 per lab)
20. Container, Hazardous Waste (small, 1 per 5 students; large, 2 per lab)
24. Counter, Hematologic (1 per student)
25. Counter, Differential (1 per student)
26. Eye Wash Station (1 per lab)
27. Fibrometers (1 per lab)
28. Freezer (1 per program)
29. Hood, Fume (1 per program)
30. Hot Plate with Stirrer (2 per lab)
31. Incinerator, Bacteriologic (1 per student)
32. Incubator, CO_2 (1 per lab)
33. Incubator, Dri Bath (small, 1 per student; large, 1 per 4 students)
34. Incubator, General (1 per lab)
35. Jar, Anaerobic system (2 per lab)
36. Meter, Total Solids (1 per lab)
37. Microscopes, Binocular (1 per student)
38. Microscope, Dual Head (1 per lab)
39. Microscope, Fluorescent (1 per lab)
40. Microscope, Objectives, 4X, 10X, 40X, !00X (1 set per student)
41. Microscope, Phase Contrast (1 per lab)
42. Microscope Trinocular (1 per lab)
43. Mixer, Vortex (2 per program)
44. Monitor, Glucose (1 per program)

45. Ovens, Drying (1 per program)
46. Pipets, Automatic (1 set per 10 students)
47. Reader, Capillary Tube (1 per lab)
48. Refractometer (1 per 5 students)
49. Refrigerator (commercial, 1 per lab; home, 2 per lab)
50. Rotator, Automatic with Timer (1 per lab)
51. Safety Shower (1 per lab)
52. Scale, Balance, Analytical (1 per lab)
53. Spectrophotometer (1 per 5 students)
54. Spectrophotometer, Fluorometer (0 per new lab)
55. Stainer, Slide (1 per lab)
56. Station, Hazardous Spill (1 per lab)
57. System, Microbiology ID Sensitivity (manual, 1 per lab; automated, 0 per lab)
58. System, Water Purification (1 per program)
59. Tachometer (1 per program)
60. Viewers, Agglutination (1 per student)
61. Washer, Glassware (Regular) (0 per new lab)
62. Washer, Pipette (1 per lab)
63. Timers (1 per student)
64. Glassware, assorted set (1 set per student)
65. Hemacytometer (1 per student)
66. Stopwatches (1 per 2 students)
67. Thermometers (reference, 1 per lab; regular, 5 per lab)
68. Tray, Phlebotomy (1 per 4 students)

RECOMMENDED INSTRUCTIONAL AIDS

1. CD ROM with Soundcard (upgrade for present computer) (1 per 5 students)
2. Computer, CD ROM with Soundcard (1 per 5 students)
3. Computer Memory Upgrade (1 per 5 students)
4. ELMO - LCD presentation system (0 per lab)
5. Laser Disk Player with Barcode (1 per program)
6. Printer, Laser (1 per 2 computers)
7. Projector, Overhead (2 per program)
8. Projector, Slide (1 per program)
9. Projector Screen (2 per program)
10. Station, MSDS Information (1 per program)
11. TV Monitor (1 per program)
12. VCR (1 per program)
13. Video Monitor and Camera (1 per program)

Slide Sets: (1 set per program)

Blood and Tissue Parasites
Protozoa
Intestinal Parasites
Body Fluids
Urinalysis/Sediment
Normal and Abnormal Hematology
Immunology/Serology
Microbiology
Immunohematology
Mycology
Clinical Chemistry

Videos: (1 of each per program)

Lab Safety
Phlebotomy/Capillary Puncture
Medical Laboratory Careers
Instrumentation (set of 3)
Universal Precautions
Parasitology
Microbiology
Mycology
Body Fluids
Urinalysis/Sediment
Clinical Chemistry
Hematology

Immunology/Serology
Immunohematology

Laser Disks: (1 each per program)

Lab Safety
Phlebotomy/Capillary Puncture
Medical Laboratory Careers
Instrumentation
Universal Precautions
Parasitology
Microbiology
Mycology
Body Fluids
Urinalysis/Sediment
Clinical Chemistry
Hematology
Immunology/Serology
Immunohematology

Software Packages: (1 site license or 1 each per computer)

Parasitology
Microbiology
Mycology
Body Fluids
Urinalysis/Sediment
Clinical Chemistry
Hematology
Immunology/Serology
Immunohematology

Suggested References: (1 each per program)

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Wellington, Joe, Padleckas, Regina, and Swerdlow, Martin. An Atlas of Urinary Sediments. (1st ed.). North Chicago, IL: Abbott Labs. 1980.
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APPENDIX A:

RELATED ACADEMIC TOPICS

APPENDIX A

RELATED ACADEMIC TOPICS FOR COMMUNICATIONS

C1 Interpret written material.
C2 Interpret visual materials (maps, charts, graphs, tables, etc.).
C3 Listen, comprehend, and take appropriate actions.
C4 Access, organize, and evaluate information.
C5 Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.
C6 Communicate ideas and information effectively using various oral and written forms for a variety of audiences and purposes.

EXPANDED TOPICS FOR COMMUNICATIONS

TOPIC C1: Interpret written material.

C1.01 Read and follow complex written directions.
C1.02 Recognize common words and meanings associated with a variety of occupations.
C1.03 Adjust reading strategy to purpose and type of reading.
C1.04 Use sections of books and reference sources to obtain information.
C1.05 Compare information from multiple sources and check validity.
C1.06 Interpret items and abbreviations used in multiple forms.
C1.07 Interpret short notes, memos, and letters.
C1.08 Comprehend technical words and concepts.
C1.09 Use various reading techniques depending on purpose for reading.
C1.10 Find, read, understand, and use information from printed matter or electronic sources.

TOPIC C2: Interpret visual materials (maps, charts, graphs, tables, etc.).

C2.01 Use visuals in written and in oral presentations.
C2.02 Recognize visual cues to meaning (layout, typography, etc.).
C2.03 Interpret and apply information using visual materials.

TOPIC C3: Listen, comprehend, and take appropriate action.

C3.01 Identify and evaluate orally-presented messages according to purpose.
C3.02 Recognize barriers to effective listening.
C3.03 Recognize how voice inflection changes meaning.
C3.04 Identify speaker signals requiring a response and respond accordingly.
C3.05 Listen attentively and take accurate notes.
C3.06 Use telephone to receive information.

C3.07 Analyze and distinguish information from formal and informal oral presentations.

TOPIC C4: Access, organize, and evaluate information.

C4.01 Distinguish fact from opinion.
C4.02 Use various print and non-print sources for specialized information.
C4.03 Interpret and distinguish between literal and figurative meaning.
C4.04 Interpret written or oral communication in relation to context and writer's point of view.
C4.05 Use relevant sources to gather information for written or oral communication.

TOPIC C5: Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.

C5.01 Select appropriate words for communication needs.
C5.02 Use reading, writing, listening, and speaking skills to solve problems.
C5.03 Compose inquiries and requests.
C5.04 Write persuasive letters and memos.
C5.05 Edit written reports, letters, memos, and short notes for clarity, correct grammar, and effective sentences.
C5.06 Write logical and understandable statements, phrases, or sentences for filling out forms, for correspondence or reports.
C5.07 Write directions or summaries of processes, mechanisms, events, or concepts.
C5.08 Select and use appropriate formats for presenting reports.
C5.09 Convey information to audiences in writing.
C5.10 Compose technical reports and correspondence that meet accepted standards for written communications.

TOPIC C6: Communicate ideas and information using oral and written forms for a variety of audiences and purposes.

C6.01 Give complex oral instructions.
C6.02 Describe a business or industrial process/mechanism.
C6.03 Participate effectively in group discussions and decision making.
C6.04 Produce effective oral messages utilizing different media.
C6.05 Explore ideas orally with partners.
C6.06 Participate in conversations by volunteering information when appropriate and asking relevant questions when appropriate.
C6.07 Restate or paraphrase a conversation to confirm one's own understanding.
C6.08 Gather and provide information utilizing different media.

C6.09 Prepare and deliver persuasive, descriptive, and demonstrative oral presentations.

RELATED ACADEMIC TOPICS FOR MATHEMATICS

M1 Relate number relationships, number systems, and number theory.
M2 Explore patterns and functions.
M3 Explore algebraic concepts and processes.
M4 Explore the concepts of measurement.
M5 Explore the geometry of one-, two-, and three-dimensions.
M6 Explore concepts of statistics and probability in real world situations.
M7 Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

EXPANDED TOPICS FOR MATHEMATICS

TOPIC M1: Relate number relationships, number systems, and number theory.

M1.01 Understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, and scientific notation) in real world and mathematical problem situations.
M1.02 Develop number sense for whole numbers, fractions, decimals, integers, and rational numbers.
M1.03 Understand and apply ratios, proportions, and percents in a wide variety of situations.
M1.04 Investigate relationships among fractions, decimals, and percents.
M1.05 Compute with whole numbers, fractions, decimals, integers, and rational numbers.
M1.06 Develop, analyze, and explain procedures for computation and techniques for estimations.
M1.07 Select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods.
M1.08 Use computation, estimation, and proportions to solve problems.
M1.09 Use estimation to check the reasonableness of results.

TOPIC M2: Explore patterns and functions.

M2.01 Describe, extend, analyze, and create a wide variety of patterns.
M2.02 Describe and represent relationships with tables, graphs, and rules.
M2.03 Analyze functional relationships to explain how a change in one quantity results in a change in another.
M2.04 Use patterns and functions to represent and solve problems.
M2.05 Explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations.

M2.06 Use a mathematical idea to further their understanding of other mathematical ideas.
M2.07 Apply mathematical thinking and modeling to solve problems that arise in other disciplines, such as art, music, and business.

TOPIC M3: Explore algebraic concepts and processes.

M3.01 Represent situations and explore the interrelationships of number patterns with tables, graphs, verbal rules, and equations.
M3.02 Analyze tables and graphs to identify properties and relationships and to interpret expressions and equations.
M3.03 Apply algebraic methods to solve a variety of real world and mathematical problems.

TOPIC M4: Explore the concepts of measurement.

M4.01 Estimate, make, and use measurements to describe and compare phenomena.
M4.02 Select appropriate units and tools to measure to the degree of accuracy required in a particular situation.
M4.03 Extend understanding of the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass.
M4.04 Understand and apply reasoning processes, with special attention to spatial reasoning and reasoning with proportions and graphs.

TOPIC M5: Explore the geometry of one-, two-, and three-dimensions.

M5.01 Identify, describe, compare, and classify geometric figures.
M5.02 Visualize and represent geometric figures with special attention to developing spatial sense.
M5.03 Explore transformations of geometric figures.
M5.04 Understand and apply geometric properties and relationships.
M5.05 Classify figures in terms of congruence and similarity and apply these relationships.

TOPIC M6: Explore the concepts of statistics and probability in real world situations.

M6.01 Systematically collect, organize, and describe data.
M6.02 Construct, read, and interpret tables, charts, and graphs.
M6.03 Develop an appreciation for statistical methods as powerful means for decision making.
M6.04 Make predictions that are based on exponential or theoretical probabilities.

M6.05 Develop an appreciation for the pervasive use of probability in the real world.

TOPIC M7: Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

M7.01 Use computers and/or calculators to process information for all mathematical situations.
M7.02 Use problem-solving approaches to investigate and understand mathematical content.
M7.03 Formulate problems from situations within and outside mathematics.
M7.04 Generalize solutions and strategies to new problem situations.

RELATED ACADEMIC TOPICS FOR SCIENCE

S1 Explain the Anatomy and Physiology of the human body.
S2 Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.
S3 Relate the nine major phyla of the kingdom anomaly according to morphology, anatomy, and physiology.
S4 Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.
S5 Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.
S6 Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.
S7 Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance, population genetics, the structure and function of DNA, and current applications of DNA technology.
S8 Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

EXPANDED TOPICS FOR SCIENCE

TOPIC S1: Explain the Anatomy and Physiology of the human body.

S1.01 Recognize common terminology and meanings.
S1.02 Explore the relationship of the cell to more complex systems within the body.

S1.03 Summarize the functional anatomy of all the major body systems.
S1.04 Relate the physiology of the major body systems to its corresponding anatomy.
S1.05 Compare and contrast disease transmission and treatment within each organ system.
S1.06 Explore the usage of medical technology as related to human organs and organ systems.
S1.07 Explain the chemical composition of body tissue.

TOPIC S2: Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.

S2.01 Identify the major types and structures of plants, viruses, monera, algae protista, and fungi.
S2.02 Explain sexual and asexual reproduction.
S2.03 Describe the ecological importance of plants as related to the environment.
S2.04 Analyze the physical chemical and behavioral process of a plant.

TOPIC S3: Relate the nine major phyla of the kingdom anomaly according to morphology, anatomy, and physiology.

S3.01 Explain the morphology, anatomy, and physiology of animals.
S3.02 Describe the characteristics, behaviors, and habitats of selected animals.

TOPIC S4: Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.

S4.01 Examine minerals and their identification, products of the rock cycle, byproducts of weathering, and the effects of erosion.
S4.02 Relate the Hydrologic Cycle to include groundwater its zones, movement, and composition; surface water systems, deposits, and runoff.
S4.03 Consider the effects of weather and climate on the environment.
S4.04 Examine the composition of seawater; wave, tides, and currents; organisms, environment, and production of food; energy, food and mineral resources of the oceans.

TOPIC S5: Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.

S5.01 Examine the science of chemistry to include the nature of matter, symbols, formulas and nomenclature, and chemical equations.

S5.02 Identify chemical reactions including precipitation, acids-bases, and reduction-oxidation.
S5.03 Explore the fundamentals of chemical bonding and principles of equilibrium.
S5.04 Relate the behavior of gases.
S5.05 Investigate the structure, reactions, and uses of organic compounds; and investigate nuclear chemistry and radiochemistry.

TOPIC S6: Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.

S6.01 Examine fundamentals of motion of physical bodies and physical dynamics.
S6.02 Explore the concepts and relationships among work, power, and energy.
S6.03 Explore principles, characteristics, and properties of electricity, magnetism, light energy, thermal energy, and wave energy.
S6.04 Identify principles of modern physics related to nuclear physics.

TOPIC S7: Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance; population genetics, the structure and function of DNA, and current applications of DNA technology.

S7.01 Examine principles, techniques, and patterns of traits and inheritance in organisms.
S7.02 Apply the concept of population genetics to both microbial and multicellular organism.
S7.03 Identify the structure and function of DNA and the uses of DNA technology in science, industry, and society.

TOPIC S8: Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

S8.01 Apply the components of scientific processes and methods in classroom and laboratory investigations.
S8.02 Observe and practice safe procedures in the classroom and laboratory.
S8.03 Demonstrate proper use and care for scientific equipment.
S8.04 Investigate science careers, and advances in technology.
S8.05 Communicate results of scientific investigations in oral, written, and graphic form.

APPENDIX B:

WORKPLACE SKILLS

APPENDIX B
WORKPLACE SKILLS FOR THE 21ST CENTURY

WP1 Allocates resources (time, money, materials and facilities, and human resources).

WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.

WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.

WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.

WP5 Selects, applies, and maintains/troubleshoots technology.

WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.

APPENDIX C:

STUDENT COMPETENCY PROFILE

STUDENT COMPETENCY PROFILE

Student: _____

This record is intended to serve as a method of noting student achievement of the competencies in each course. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the program.

In the blank before each competency, place the date on which the student mastered the competency.

Fundamentals of Medical Laboratory Technology/Phlebotomy (MLT 1111)

_____ 1. Explain the relationship between medical ethics and professionalism to the field of clinical laboratory science.
_____ 2. Recommend and implement currently approved laboratory safety procedures.
_____ 3. Select and use basic equipment to perform selected laboratory skills.
_____ 4. Explain and practice laboratory specimen collection techniques.

Urinalysis/Body Fluids (MLT 1212)

_____ 1. Describe the formation and composition of urine.
_____ 2. Explain the properties involved in the physical, chemical, and microscopic examinations of urine.
_____ 3. Perform the testing involved in the physical, chemical, and microscopic examinations of urine.
_____ 4. Describe the laboratory testing and the formation of other body fluids (i.e., synovial, CSF, seminal, serous body fluids, amniotic fluids, etc.).

Hematology I (MLT 1313)

_____ 1. Discuss and identify the origin and characteristics of normal blood cell lines.
_____ 2. Perform routine manual and automated hematology procedures.
_____ 3. Explain the role of hematology safety and quality control.
_____ 4. Explain and perform quality control procedures and interpret data.
_____ 5. Correlate clinical conditions with hematology test results.

Immunology/Serology (MLT 1413)

_____ 1. Describe the body's immune defenses.
_____ 2. Describe the principles of immunoassays.

_____ 3. Perform routine immunology/serology procedures with emphasis on accuracy and precision.
_____ 4. Correlate results of immunological procedures with clinical conditions.

Hematology II (MLT 1324)

_____ 1. Discuss and identify the origin and characteristics of abnormal blood cells.
_____ 2. Correlate clinical conditions with abnormal hematology laboratory results.
_____ 3. Describe the interaction of blood vessels, platelets, coagulation factors, and fibrinolytic systems in normal and abnormal hemostasis.
_____ 4. Perform and interpret manual and automated hematology coagulation procedures.

Clinical Chemistry (MLT 1515)

_____ 1. Describe chemistry test methods used to measure substances in the blood and other body fluids.
_____ 2. Correlate health and disease states with chemistry test results.
_____ 3. Perform laboratory tests outlined by the test manufacturer to determine the presence and/or amount of substances(s) in the blood and other body fluids.
_____ 4. Solve laboratory mathematics problems.
_____ 5. Perform quality control procedures as used in the clinical chemistry laboratory with emphasize on accuracy and precision.

Immunohematology (MLT 2424)

_____ 1. Relate principles of immunology to immunohematology.
_____ 2. Perform basic procedures used in a blood bank laboratory.
_____ 3. Assess component utilization in transfusion therapy.
_____ 4. Describe basic concepts of genetics.
_____ 5. Explain, perform, and interpret quality control in the blood bank laboratory.

Parasitology (MLT 2612)

_____ 1. Describe the life cycle of medically important parasites.
_____ 2. Discuss isolation and identification techniques used in a clinical parasitology laboratory.
_____ 3. Identify medically important parasites.

Pathogenic Microbiology (MLT 2614)

_____ 1. Discuss transmission methods of disease and host susceptibility.
_____ 2. Identify organisms of medical importance, and correlate results with reading of plates, gram stain reactions, and biochemical studies.
_____ 3. Perform susceptibility testing.
_____ 4. Perform safety, QC, and infection control practices of the microbiology laboratory.
_____ 5. Explain the principle and operation of automated instrumentation.
_____ 6. Explain procedure used for collection of microbiologic specimens from various body sites.

MLT Seminar (MLT 2711)

_____ 1. Present and critique various case studies.
_____ 2. Complete a mock certification exam.
_____ 3. Demonstrate an understanding of the skills required for successful employment.

Certification Fundamentals for MLT (MLT 2713)

_____ 1. Correlate laboratory skills from areas with knowledge obtained from didactic and clinical experiences.
_____ 2. Compare student's pre-testing results in each area with post-testing results.
_____ 3. Practice computer constructed tests by using computer software.
_____ 4. Correlate registry/certifying item descriptor list with curriculum content.

Clinical Instrumentation (MLT 2812)

_____ 1. Describe light and instruments that measure light including spectrophotometer, nephelometer, and fluorometer.
_____ 2. Describe instruments that require other spectral techniques.
_____ 3. Describe electrophoresis techniques performed in the laboratory.
_____ 4. Explain the principle of chromatography.
_____ 5. Describe the principle of electrochemical measurements.
_____ 6. Discuss the use of radioactive isotopes in the laboratory.
_____ 7. Describe the principles of immunochemical techniques.
_____ 8. Describe the principles of osmometry.
_____ 9. Discuss the basic principles of automation in the laboratory.
_____ 10. List and describe the use of a laboratory information system.
_____ 11. Describe basic automated hematology instrumentation.

_____ 12. Discuss routine maintenance, quality control, and troubleshooting procedures.

Clinical Practice I, II, III (MLT 2916, MLT 2926, MLT 2936)

_____ 1. Process and collect specimens for testing and analysis.
_____ 2. Perform analytical examinations on cellular products and body fluids.
_____ 3. Recognize factors that affect testing procedures and results, and take action when predetermined limits are exceeded.
_____ 4. Participate in an established quality control program.
_____ 5. Demonstrate professional conduct, communication, and interpersonal relations with laboratory personnel, patients, other health care professionals, as well as with the public.